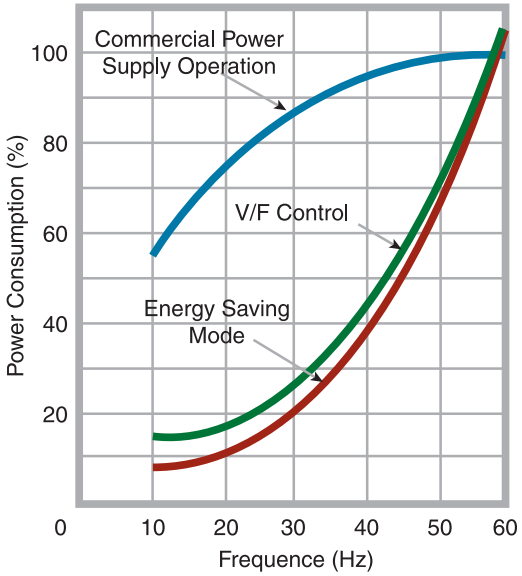
M-4000 Series

VARIABLE FREQUENCY DRIVES

MGI Technologies

600 Volt Class Dual Rated VFD

With Special Features For Fan and Pump Applications



FR-PU04 parameter unit (option)

Standard Keypad

Exceptional Efficiency
Automatic energy savings mode ensures maximum energy savings for fan and pump applications at all speeds and loads by continuously tuning the output voltage to match the load requirement.

Flexible Control
The Standard Display Unit includes digital and LED display of operational settings, conditions and status and meets most application requirements.

The Optional High-performance Parameter Display Unit utilizes a backlit multi line screen and 24 keys to program and dislay all settings, conditions, status and the last 8 faults in eight different languages.

Communication though RS485 with Windows based sofware is standard. Many communication option boards are available for connection and control by specific protocol.

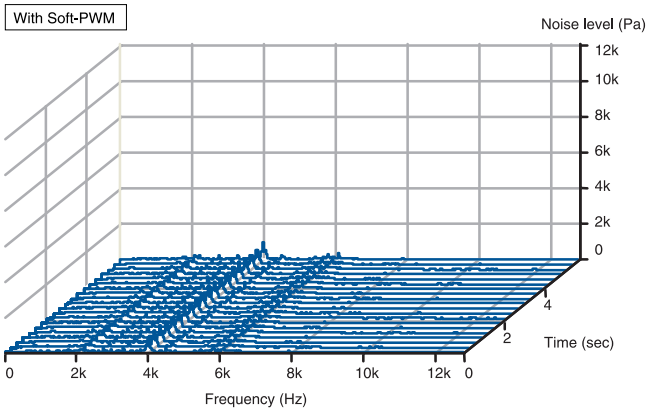
Less Noise
Soft PWM Control suppresses acoustic noise and limits RFI noise to minimum levels.

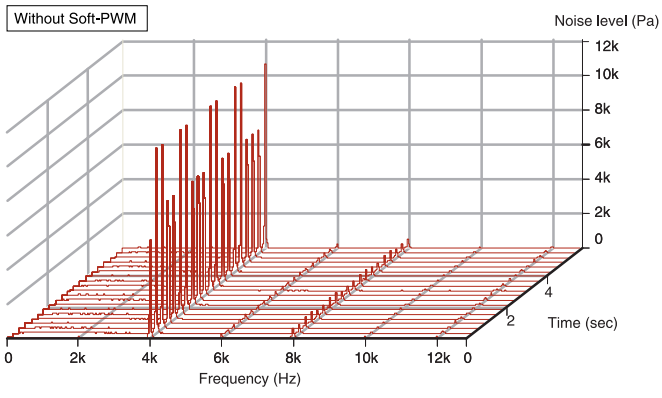
Advanced PID with sequencing of up to four motors.
Modes of operation include;

Basic
The VFD controls motor one & relay outputs control motors 2, 3 & 4.

Alternating
Same as basic except the VFD controlled motor is switched after each stop.

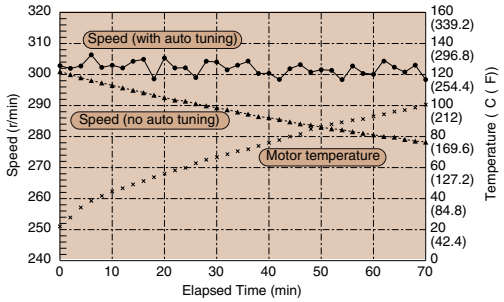
Direct
Each motor is started by the VFD and switched to line power at full speed.



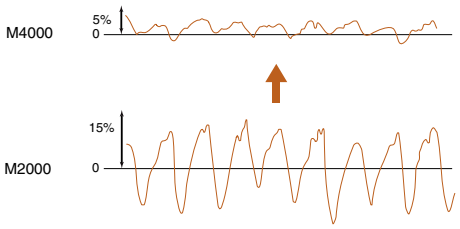


With Special Features For Constant Torque Applications

Example of motor temperature/speed variation characteristics (4P, 5 HP motor). (Repeated operations at 90% usage rate on-line auto tuning selected)



Example of comparative data on uneven rotation (inverter operation frequency: 3Hz; 4P, 5 HP motor).



The Ability to Maximize Drive Performance

Advanced Flux Vector Control

New levels in drive performance have been achieved thanks to the use of advanced flux vector control.

High-Precision Operations Without an Encoder

the units feature a RISC processor which is used for on-line auto tuning, turning the motor quickly when starting. This allows it to perform high-precision operations that are unaffected by motor temperature, as well as stable high-torque operation form ultra low speeds.

- speed control range: 1:120 (0.5 - 60Hz, driving mode)
- using the auto tuning function, high precision operation is possible with motors from all over the world.

Boost Performance Improved with Encoder Feedback

Speed control is further enhanced by equipping the motor with an encoder, and adding plug-in option card:

- Speed control range: 1:1000 (driving mode)
- Speed Variation rate: ±0.02% (driving mode)
- 0 RPM holding torque up to 100% continuous / 150% intermittent

Smart Driver

Uneven rotation at low speeds has been greatly improve by the use of a smart driver (a newly developed ASIC) which directly monitors and controls the main circuit's status.

- uneven rotation: less than half that of a conventional inverter at 1Hz

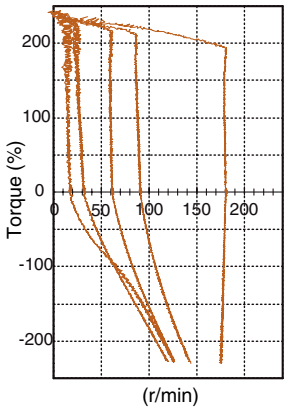
Expandable I/O

Various I/O option boards are available in addition to the standard I/O configuration including Digital/Relay signals, Analog signals, Pulse Train & Network Protocol etc. Up to three boards can be connected at one time.

Easy Maintenance

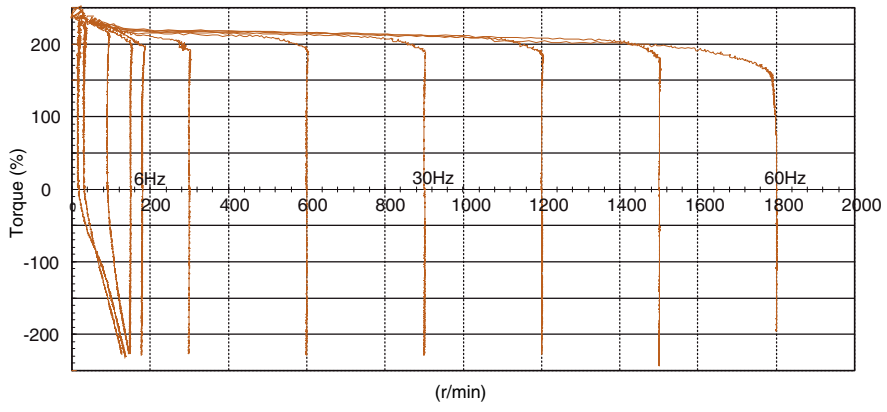
Simple removal and installation of circuit boards, terminal blocks and cooling fans make maintenance easy. Set-up parameters can saved and written to a repaired or replaced unit to eliminate the need to reprogram after servicing. Cooling fan life has been extended by use of intelligent On/Off control.

Example of speed/torque characteristics during low-speed operations (4P, 5 HP motor without encoder).



Enlarged

Example of speed/torque characteristics when using advanced flux vector control (on-line tuning selected, 4P, 5 HP motor without encoder).



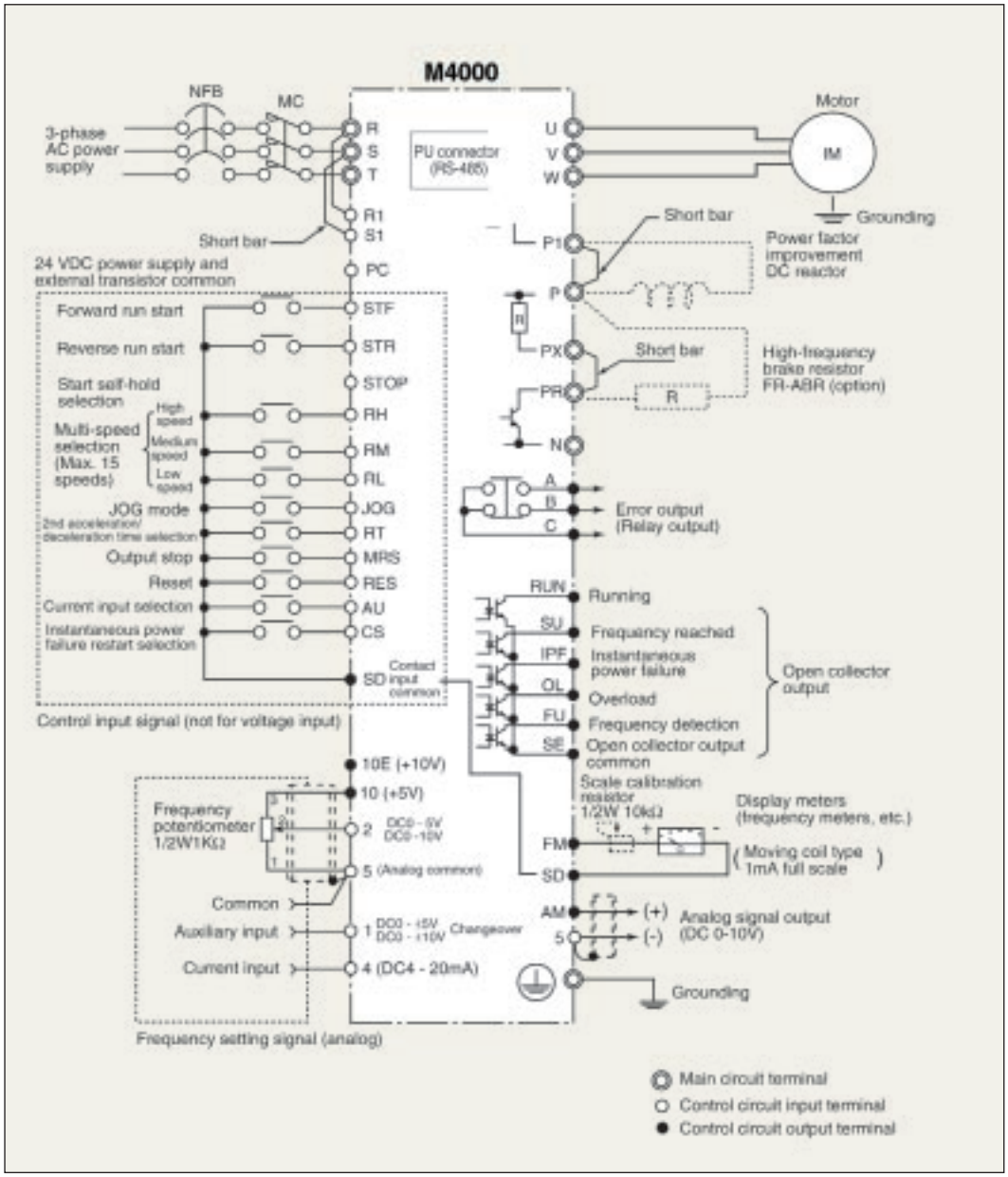
General Specifications

Model M4500 -		001	003	005	010	025	040	060	100	150	200	250
HorsepowerRating	Variable Torque	1	3	5	10	25	40	60	100	150	200	250
	Constant Torque	1	3	5	10	20	30	50	75	125	150	200
Rated Output Current continuous (A)	Variable Torque	1.8	4.7	7.3	14.8	27	41	62	99	152	202	255
	Constant Torque	1.7	4	6.1	12	22	33	55	84	132	152	202
Overload Rating	Variable Torque	120% 60 sec., 150% 0.5 sec. (Inverse time characteristic)										
	Constant Torque	150% 60 sec., 200% 0.5 sec. (Inverse time characteristics)										
Rated Input Voltage		490 - 632 Volts; 3 Phase; 60 Hz ±5%										
Enclosure		Fully Enclosed IP 20								Chassis IP 00		
Approximate Weight (kg)		7	7	7	7	15	15	55	55	93	94	149
Height (mm)		260	260	260	260	400	400	807.5	807.5	740	740	1010
Width (mm)		220	220	220	220	250	250	450	450	480	480	498
Depth (mm)		170	170	170	170	190	190	250	250	360	360	380

Control Method			Soft-PWM control, high-carrier frequency PWM control (V/F control, advanced flux vector control selection)
Control Specifications	**Carrier Frequency**	**1-100 HP**	700Hz to 14.5K Hz. Maximum 5KHz for Soft PWM. Maximum 8K Hz. for Variable Torque Rating.
		150 - 1300 HP	700Hz, 1K Hz, 2.5K Hz. Maximum 1KHz for Soft PWM. 2.5KHz setting permissible only with optional sine wave filter.
	Output Frequency Range		0.2 to 400 Hz
	Frequency Control Resolution	**Analog Input**	0.015 Hz (Terminal No. 2 input: 12 bit/0 to 10V, 11 bit/0 to 5V; Terminal No. 1 input: 12 bit/-10 to +10V, 11 bit/-5 to +5V)
		Digital Input	0.01 Hz
	Frequency Precision		Within ±0.2% of max. output frequency 25°C ±10°C during analog input: within 0.01% of set output frequency during digital input
	Voltage / Frequency Characteristics		Any base frequency setting possible between 0 and 400 Hz; constant torque or variable torque pattern selection possible.
	Starting Torque		150% at 0.5 Hz (advanced flux vector control)
	Torque Boost		Manual torque boost
	Acceleration / Deceleration Time Setting		0 to 3600 sec. (individual setting for acceleration/deceleration possible), linear or S-curve mode
	DC Braking		Operation frequency (0 to 120 Hz), operation time (0 to 10 sec.), operation voltage (0 to 30%) variable
	Stall Prevention Operation Level		1 - 500 HP Operation current level setting possible (0 to 200% variable), enable/disable selection
			650 - 1300 HP Operation current level setting possible (0 to 150% variable), enable/disable selection
Operation Specifications	**Frequency Setting Signal**	**Analog Input**	DC 0 to 5V, 0 to ±10V, 4 to 20mA
		Digital Input	Input from control panel, parameter unit; BCD 3-digit or 12-digit binary (using option FR-A5AX)
	Starting Signal		Individual selection of forward run, reverse run; starting signal self-hold input (3-wire input) selective
	Input Signal	**Multi-Speed Selection**	Up to 15 set speeds (each speed can be set between 0 and 400 Hz; speed can be changed via control panel or parameter unit during operation)
		2nd, 3rd Accel. / Decel. Time	0 to 3600 sec. (max. of three individual accelerations/decelerations can be set)
		JOG Operation Selection	1 - 750 HP JOG operation mode selection terminal provided. JOG operation is possible with the control panel and parameter unit.
			800 - 1300 HP JOG is internally allocated: Customer cannot re-assign.
		Current Input Selection	Select input of frequency setting signal 4 to 20 mA DC (terminal No. 4)
		Output Stop	Instant cutoff of inverter output (frequency, voltage)
		Error Reset	Reset of protection operation hold state
	Operation Functions		Upper/lower limit frequency setting, frequency jump operation, external thermal input selection, reverse polarity operation, instantaneous power failure restart operation, commercial power supply inverter switch-over function, forward run/reverse run prevention, slip compensation, operation mode selection, off-line auto tuning function, online auto tuning function, PID control, programmed operation, computer link operation (RS-485)
	Output Signal	**Operation Status**	Five types can be selected from: inverter running, frequency reached, instantaneous power failure (undervoltage), frequency detection, 2nd frequency detection, 3rd frequency detection, in program mode operation, in PU operation, overload warning, regenerative brake pre-alarm, electronic thermal relay pre-alarm, zero current detection, output current detection, PID lower limit, PID upper limit, PID forward run, PID reverse run, commercial power supply-inverter switchover MC 1, 2, 3, operation ready, brake release request, fan trouble, and fin overheat pre-alarm. Open collector output.
		Error (Inverter Trip)	Relay output - contact rated (230 VAC, 0.3A / 30 VDC, 0.3A); open collector - alarm code (4-bit) output
		For Meter	One type can be selected from: output frequency, motor current (constant or peak value), output voltage, frequency setting value, operation speed, motor torque, converter output voltage (constant or peak value), regenerative brake duty, electronic thermal relay load rate, input power, output power, load meter and motor excitation current. Pulse train output (1,440 pulse/sec./full scale) or analog output (0 to 10 VDC).
Display	**Displayed on FR-DU04 Control Panel or FR-PU04 Parameter Unit**	**Operation Status**	Select from output frequency, motor current (constant or peak value), output voltage, frequency setting value, operation speed, motor torque, overload, converter output voltage (constant or peak value), electronic thermal relay load rate, input power, output power, load meter, motor excitation current, cumulative power ON time, actual operation time, cumulative power, regenerative brake duty and motor load rate.
		Error Details	Details of errors are displayed when the protective function activates. Details of up to eight errors are saved. (Only four errors are displayed on the control panel.)
	Additional Displays Only on FR-PU04 Parameter Unit	**Operation Status**	Input terminal signal status, output terminal signal status, option mounting status, terminal assignment status.
		Error Details	Output voltage, current, frequency and cumulative power ON time before protective function activates
		Interactive	Operation guide and troubleshooting with help function
Protective and Warning Functions			Overcurrent cutoff (during accleration, deceleration, constant speed), regenerative overvoltage cutoff, undevoltake, instantaneous power failure, overload cutoff (electronic thermal relay), brake transistor error. Ground fault overcurrent, output short circuit (on 100 HP or smaller), stall prevention, overload warning, brake rsistor overheating, fin overheating, fan trouble (on 100 HP or smaller), option error, parameter error, PU disconnected number of retries exceeded, output phase loss, CPU error, 24 VDC power output short circuit, control panel power short circuit, main circuit fault (on 150 HP or greater)
Environment	**Ambient Temperature**	1 - 100 HP	-10°C to +40°C, no frost or condensation. -10°C to +30°C when the the FR-A5CV dirt protection attachment is used.
		150 - 500 HP	-10°Cto +50°C, no frost or condensation.
		650 - 750 HP	-10°C to +50°C, constant torque rating -10°C to +40°C variable torque rating, no frost or condensation.
		800 - 1300 HP	-10°C to +50°C, no frost or condensation.
	Ambient Humidity		90% RH or less (no condensation)
	Storage Temperature		20° to 65°C Temperatures to which the units can be exposed for a short time, such as during transportation.
	Atmosphere		Indoors (no corrosive gases, flammable gases, oil mist or dust)
	Altitude		1000m above sea level. Contact factory for higher altitude deratings.
	Vibration		5.9 m/s² (0.6G max.) based on JIS C 0911

Model M4500 -		300	400	500	650	750	800	900	1000	1100	1200	1300
HorsepowerRating	Variable Torque	300	400	500	650	750	800	900	1000	1100	1200	1300
	Constant Torque	250	300	400	550	650	750	800	900	1000	1100	1200
Rated Output Current continuous (A)	Variable Torque	304	402	496	663	773	800	900	990	1100	1210	1320
	Constant Torque	255	304	402	552	663	773	800	880	990	1100	1210
Overload Rating	Variable Torque	120% 60 sec., 150% 0.5 sec. (Inverse time characteristic)										
	Constant Torque	150% 60 sec., 200% 0.5 sec. (Inverse time characteristics)										
Rated Input Voltage		490 - 632 Volts; 3 Phase; 60 Hz ±5%										
Enclosure		Chassis IP 00				Open Type IP 20						
Approximate Weight (kg)		155	266	290	490	500	1060	1060	1100	1100	1200	1200
Height (mm)		1010	1010	1330	1900	1900	2900	2900	2900	2900	2900	2900
Width (mm)		498	680	790	1100	1100	2300	2300	2300	2300	2300	2300
Depth (mm)		380	380	440	500	500	800	800	800	800	800	800

Terminal Connection Diagram



VFD Systems Engineered

NEMA 1, NEMA 12
Sprinkler Proof Panels

NEMA 12
MCC Line-Up

And Configured To Your Specifications

Key Market Sectors:

- Water, Waste-Water
- Heating Ventilating & Air Conditioning
- Oil & Gas

Options include:

1. Harmonic Mitigation Techniques
   - AC & DC Reactors
   - Tuned & Wide Spectrum Passive Filters
   - Phase Shifting Loads, 12 Pulse & 18 Pulse
2. PLCs & Touch Screen Controls
3. Bypass Systems
4. Motor Filters

NEMA 3R Outdoor Weatherproof Panels

(Pa)

NEMA 4X Stainless Steel Air Conditioned MCC Line-Up

Factory Locations:

7855 Tranmere Dr. Mississauga, Ontario, L5S 1V5
Telephone: 905-612-9806 Fax: 905-612-9451

110-8410 Ontario St. Vancouver, B.C. Canada, V5X 4S6
Telephone : 604-709-8600 / Toll Free Tel : 877-539-2542
Fax : 604-872-8560 / Toll Free Fax : 800-539-2542

www.mgitech.com